

APPENDIX

AVTEC BSS 7239 Toxic Gas Analysis Test

The results were obtained from a 5/8" thick balsa cored panel with vinyl ester and glass surface skins coated with Thermashield™. The panel was exposed according to the BSS 7239 test protocol for a four minute exposure to 2.5 kW/cm² in the flaming mode. Colorimetric Gas Detection Tubes were used in the toxic gas analysis. The tests were conducted and certified by VTEC Laboratories, Bronx, New York. At no time did the test flame front penetrate the vinyl ester surfaces or corrupt the balsa wood core.

Ambient Temperature 47°F, Relative Humidity 0.65, Bar. Pressure 29.91 in. Hg¹

Gas	Corrected PPM ¹	Corrected PPM ²	Average PPM	Std. Deviation Rail PPM	U.S Passenger Requirements For Interior Use (PPM)
CO	270	200	235	49.497	< 3500
HCN	5	5	5	0	< 150
SO₂	0	0	0	0	< 100
HCL	1	1	1	0	< 500
HF	0	0	0	0	< 200
NO	40	20	30	14.42	< 100
NO₂	4	2	3	1.414	< 100

Specimen wgt. 49.7g, ² Specimen wgt. 52.6g 45psi pressure

ASTM E-162 Surface Flammability Test

The results from this test were obtained from cored vinyl ester glass reinforced laminate specimens cured in a press and coated with a 63 mil thick layer of Thermashield™. This test, the Standard Method of Test for Surface Flammability of Materials Using a Radiant Heat Energy Source, is to determine the relative surface flammability performance of various materials under specific test conditions when using a radiant heat source. The results are recorded as a Flame spread Index.

Please refer to the test data and results below. The Flame Spread (Is) is calculated by multiplying the Flame spread Factor (Fs), the speed at which the flame front burns down the specimen, times the Evolution of Heat Factor (Q), determined by the maximum temperature developed in the stack above the burning sample as a result of the burning characteristics of the material under test. NFPA – No. 101 classifies Class A (I) Flame spread to be 0 to 25, Class B (II) Flame spread to be 26 to 75, and Class B (III) Flame spread to be 76 to 100. As indicated below, the test results indicate the laminate panel attained a Class A (I) Flame spread.

E-162

FLAME

SPREAD

DATA

COMPANY:PRODUCT: 81006010COLOR: BeigeDIMENSIONS: 6" X 18"THICKNESS: 0.766"**OBSERVATIONS:**AL. FOIL ? YESEXP TIME: 15 MIN.DATE: 12/17/99No unusual
observations.

TIME TO: SAMPLE #	3 INCHES min.	6 INCHES min.	9 INCHES min.	12 INCHES min.	15 INCHES min.
1	4.88	13.97	-	-	-
2	6.70	8.73	-	-	-
3	7.00	-	-	-	-
4	8.00	-	-	-	-

SAMPLE	Fs	Q	Sample Wt KG	Base Temp deg C	Max Temp deg C	Is	INDEX
1	1.31	9.81	1.047	199	251	12.91	
2	1.46	7.93	1.033	199	241	11.56	
3	1.14	8.49	1.081	199	244	9.71	
4	1.12	7.36	1.043	197	236	8.28	
AVERAGE:	1.26	8.40	1.051	182	243	10.61	

TEST RESULTS

AVG FLAMESPREAD FACTOR (FS) = 1.26

AVERAGE HEAT OF EVOLUTION (Q) = 8.40

AVERAGE FLAME SPREAD INDEX (Is) = 10.61

FLAMESPREAD INDEX RANGE (Is) = 8.28 TO 12.91

ANSI / ASTM E-662 Smoke Generation Density Test

This test, the Standard Test Method for Specific Optical Density of Smoke Generated by Solid Material, is to determine the quantity of smoke generated by solid materials and assemblies in thicknesses up to and including one inch. The test is based on the attenuation (i.e.: change in the concentration) of a light beam by smoke accumulating within a closed chamber. Results are expressed in terms of specific optical density, which is derived from measuring optical density as absorbance within the chamber. The photometric scale used to measure smoke by this method is similar to the optical density scale for human vision.

The test specimens were composite 5/8" thick balsa wood cored vinyl ester laminates fabricated by the SCRIMP process with 1/16" *Thermashield** surface coating on one side. The test method protocol specifies an electrically heated radiant heat source for the non-flaming exposure of the test, and a row of air-propane flamelets to constitute the flaming combustion exposure. The test data and results are illustrated below:

DATE:	12/16/99
PROJECT #:	
SUPPLIED BY:	
PRECONDITIONING TEMP:	140 deg. F
CONDITIONING TEMP:	70 deg. F
RADIOMETER READING:	7.01 volts
FURNACE VOLTS:	110 volts
BURNER FEUL:	500 cc/min. air; 50 cc/min. propane
SPECIAL PREPARATION:	NONE
DESCRIPTION OF MATERIAL:	

SAMPLE #:	NON-FLAMING			FLAMING		
	1	2	3	4	5	6
TYPE OF	no	no	no	no	no	no
HOLDER:	trough	trough	trough	trough	trough	trough
THICK(IN.)	0.123	0.123	0.123	0.123	0.123	0.123
WEIGHT(g)	25.4	24.8	26.8	25.4	25.8	25.1
T 100%	1.01E+00	1.01E+00	1.01E+00	1.01E+00	1.00E+00	1.01E+00
T MIN	9.02E-01	9.08E-01	9.21E-01	2.90E-02	4.50E-02	4.50E-02
Tmin %	89.4	90.17	91.64	2.89	4.49	4.47
Dm(20.0 min.)	6.43	5.93	5	203.25	177.95	178.12
T(CLEAR)	9.89E-01	9.92E-01	9.81E-01	8.89E-01	8.89E-01	8.40E-01
Dc(clear)	1.1	0.9	1.4	7	6.9	10.3
Dm(c)(20min.)	5.28	5.07	3.62	196.22	171.03	167.78
Ds(1.5 min.)	1.38	-0.06	0.4	2.57	4.64	4.38
Ds(4.0 min.)	1.38	0.11	-0.23	31.22	20.62	38.38
COLOR OF SMOKE:	GREY	GRAY	GRAY	GREY	GRAY	GRAY

OBSERVATION OF THE BURNING OR SMOLDERING CHARACTERISTICS OF THE SPECIMENS DURING THE TEST SUCH AS DELAMINATION, SHRINKAGE, MELTING, ECT:
OBSERVATIONS:

OPTICAL DENSITY TEST RESULTS SUMMARY

	NON-FLAMING	FLAMING
Ds 1.5 min.	average:	0.6
Ds 4.0 min.	average:	0.4
Dm(corr)(20.0 min.)	average:	4.7
		178.3